

PORSF
11.3.31.5.1



June 20, 2001

Mr. Tom Melville
Water Quality
Department of Environmental Quality
811 SW 6th Ave
Portland, OR 97204

Re: Terminal 5 and Terminal 6 2000/20001 Dredging: Water Quality Monitoring

Mr. Melville:

Enclosed please find three letter reports:

- Reports on the Elutriate Testing and Water Quality Monitoring Programs Associated with the Terminal 5, Berth 503, and Terminal 6, Berth 603-605 Dredging Program, dated May 25, 2001;
- Field and Laboratory Analysis of Dredged Material Elutriate Quality Suttle Road Rehandle Facility, dated May 25, 2001; and
- Report of Results of the Water Quality Monitoring Programs for Terminal 5, Berth 503, and Terminal 6, Berth 603-605.

These three letter reports describe the sediment and water sampling that was performed to ensure water quality requirements were met during the 2000/2001 dredging of Terminal 5, Berth 503 and Terminal 6, Berth 603-605.

Thank you for your assistance during this project and we look forward to working with you on the next dredging project, likely to occur during the 2001/2002 dredging window.

If you have questions or comments, please do not hesitate to call me at 503/240-2011.

Sincerely,

Port of Portland
John L. Childs, P.E.
Marine Division

c: John Malek/EPA
Mark Siipola/Corps
Sebastian Degens/Port of Portland

USEPA SF



1286467



HARTCROWSER

Delivering smarter solutions

www.hartcrowser.com

June 18, 2001

Anchorage

Mr. John Childs
Project Manager, Environmental Resources
Port of Portland
P.O. Box 3529
Portland, Oregon 97208

Boston

**Re: Report on the Elutriate Testing and Water Quality Monitoring Programs
Associated with the Terminal 5, Berth 503, and Terminal 6, Berths 603-605,
Dredging Program
15045-01**

Chicago

Dear Mr. Childs:

Denver

Hart Crowser is pleased to present the following report associated with the Terminal 5, Berth 503, and Terminal 6, Berths 603-605, Dredging Program: Field and Laboratory Analysis of Dredged Material Elutriate Quality Suttle Road Handling Facility; and Report of Results of the Water Quality Monitoring Program for the Terminal 5, Berth 503, and Terminal 6, Berths 603-605. This report discusses the water quality sampling and analysis programs and presents results of the respective analyses.

Fairbanks

The Port of Portland's water quality monitoring program consisted of a four-phased approach that included: (1) *in-situ* testing for sediment quality characterization of the dredged material prior to dredging as well as elutriate water quality characterization (T-6 only); (2) turbidity and chemical monitoring of the water column during dredging activities; (3) continuous visual monitoring of the surface water turbidity during dredging; and (4) elutriate water quality sampling following placement of the dredged material into the Suttle Road Rehandling Pilot facility.

Jersey City

Juneau

In general, the results of each program are as follows:

Long Beach

- **In-situ Sediment Quality.** DDT was the only chemical found in the sediments from both Terminal 5 and Terminal 6 to be above the sediment screening levels from the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (LCRMA). The sampling results are presented in *Dredge Material Characterization Study; Marine Terminal 6, Berths 603-605; Marine Terminal 5, Berth 503*; dated November 20, 2000, and Addendum No. 1 to this report, dated December 14, 2000.

Portland

Seattle



Port of Portland
June 18, 2001

15045-01
Page 2

- Dredged Material Elutriate Testing. The laboratory modified elutriate test (MET) accurately predicted field conditions, and the dredged material elutriate water was suitable for discharge back to the river after seven days of settling time in the temporary rehandling facility. The results of the pre-dredge laboratory MET and field elutriate testing are presented in *Field and Laboratory Analysis of Dredged Material Elutriate Quality, Suttle Road Rehandling Facility*, dated May 25, 2001 (attached).
- Water Quality Monitoring during Dredging Activities. Monitoring of the water column for turbidity, chemical, temperature, dissolved oxygen, pH, and conductivity indicated no significant impacts downstream of the dredging activities. Chemical and physical sampling results are presented in *Report of Results of the Water Quality Monitoring Program for Terminal 5, Berth 503, and Terminal 6, Berths 603-605*, dated May 16, 2001 (attached).
- Visual Turbidity Monitoring. Visual turbidity monitoring was conducted by the Port construction inspector during dredging. Differences were observed for short durations beyond 100 feet of dredging activities, but no long-term differences in turbidity were observed as a result of dredging activities.

If you have any questions regarding this report, please do not hesitate to contact either one of us at (503) 620-7284.

Sincerely,

HARY CROWSER, INC.

HOWARD L. CUMBERLAND
Associate

TODD M. THORNBURG, PH.D
Senior Associate

Attachments: Field and Laboratory Analysis of Dredged Material Elutriate Quality Suttle Road Handling Facility
Report of Results of the Water Quality Monitoring Program for the Terminal 5, Berth 503, and Terminal 6, Berths 603-605

**HARTCROWSER***Delivering smarter solutions*www.hartcrowser.com

May 25, 2001

Anchorage

Mr. John Childs
Environmental Project Manager
Port of Portland
7201 N. Marine Drive
Portland, OR 97203

Boston

Re: **Field and Laboratory Analysis of Dredged Material Elutriate Quality**
Suttle Road Rehandling Facility, Port of Portland
15045

Chicago

Dear Mr. Childs:

Denver

This memo summarizes the results of dredged material elutriate testing conducted at the Port's Suttle Road Rehandling Facility following the discharge of dredged material to the facility in January and February of this year. The dredged material elutriate quality was predicted in advance of the dredging event using a Modified Elutriate Test (MET), performed according to Corps of Engineers protocols. The actual field testing results are in excellent agreement with the MET predictions. This project validates the accuracy of the MET for assessing elutriate quality at the rehandling facility. The MET should therefore be a useful test for characterizing future dredged material rehandling operations.

Fairbanks

Jersey City

Introduction

The Port conducted an environmental investigation to characterize dredged material at Terminal 5, Berth 503, and Terminal 6, Berths 603-605. The investigation was conducted to permit maintenance dredging activities at these berths (see Dredged Material Characterization Study, November 20, 2000). During this investigation, modified elutriate tests (METs) were conducted in the Hart Crowser Laboratory. The METs were designed to predict the quality of the dredged material elutriate that could be discharged over the weir at the rehandling facility and back to the Columbia River. Elutriate quality was compared to ambient water quality criteria for freshwater organisms to protect aquatic life in the Columbia River.

Juneau

Long Beach

In January and February 2001, the berths were dredged, and the dredged material was pumped into the Port's Suttle Road Rehandling Facility, an upland facility for dewatering and temporary storage of dredged material. The rehandling facility consists of two bermed

Portland

Seattle



storage areas—a primary basin and a secondary basin. The flow from the primary basin to the secondary basin is controlled by a weir, and a second weir controls flow from the secondary basin into the Columbia River. After the dredged material was placed into the primary basin and elutriate water was allowed to pass over the weir into the secondary basin, field samples were collected near the point of final discharge back to the river. This report summarizes the chemical analytical results of the field samples, and compares these field results to laboratory MET results to assess the accuracy of the MET in predicting actual field conditions.

Results

In Table 1, the predicted effluent quality, as measured in the laboratory using one-day and seven-day modified elutriate tests (MET), is compared to the actual effluent quality, as measured in field samples collected after dredged material was discharged into the Suttle Road rehandling facility. Note that these samples were not always collected at the same time intervals in the laboratory versus the field. For example, the most comprehensive chemical analysis at the rehandling facility was performed after a three-day settling period.

Turbidity. The one-day MET significantly overpredicted the suspended solids content of the effluent from the rehandling facility after the same time interval (416 mg/L TSS in the elutriate test versus 62 mg/L at the rehandling facility). This is probably due to the way settling time was measured at the rehandling facility. "One day" of settling at the rehandling facility was defined as the duration of time since the elutriate water was allowed to enter the secondary basin. Prior to that time, however, settling had already been occurring in the primary basin. Therefore, our assumption that the settling time "clock" did not begin until the elutriate water had entered the secondary basin was an overly conservative assumption.

At later settling times, the MET predicted the suspended solids content of the effluent extremely well. The seven-day MET (42 mg/L TSS) compared well with the five-day and seven-day effluent samples from the rehandling facility (61 and 31 mg/L TSS, respectively).

Metals. Dissolved metals in the dredged material effluent were predicted extremely well by the MET. All dissolved metals were well below ambient water quality criteria in both the MET and the field samples at all sampling times.

In the one-day and seven-day METs, all dissolved metals were undetected except arsenic (2.6 to 3.4 ug/L), lead (nondetect to 2.0 ug/L), and zinc (5.1 to 6.0 ug/L). After three days of settling at the rehandling facility, all dissolved metals were undetected except zinc (5.2 ug/L). The slight detections of arsenic and lead in the METs may have been caused by

microscopic suspended solids or colloidal material that passed through the laboratory filter. For example, in the one-day MET, the filtered elutriate sample still contained measurable suspended solids (7 mg/L TSS). These data suggest the MET results provide a good but conservative (i.e., slightly overestimated) prediction of effluent quality.

Tributyltin. Water quality criteria for tributyltin have not been formally promulgated. EPA issued draft water quality criteria for tributyltin; however, the agency did not respond to public comment nor issue final criteria. These draft criteria are considered as guidance in this analysis.

The TBT concentration in the dredged material effluent was predicted well by the laboratory METs. In both the laboratory and the field, TBT exceeded the draft chronic water quality criterion at early settling times, but dropped to concentrations below this criterion at later settling times. All laboratory and field samples were well below the draft acute water quality criterion.

The TBT concentration in the one-day MET was 0.14 ug/L, compared to 0.17 ug/L in the three-day field sample. TBT was undetected at 0.005 ug/L in the seven-day MET and was detected at 0.035 ug/L in the seven-day field sample. Thus, after one week of settling, both laboratory and field samples were below the draft chronic criterion of 0.063 ug/L.

It should be noted that significant TBT concentrations can occur in ambient river water in the Columbia and Willamette Rivers. For example, the river supply water (used to perform the METs) collected from the Oregon Slough off Terminal 6 contained detectable TBT concentrations that ranged from 0.02 to 0.07 ug/L (see Dredged Material Characterization Study, Table 5). Thus, the very low levels of TBT measured in the MET and the field samples from the rehandling facility may contain significant contributions from ambient river water.

PAHs. The majority of PAHs were undetected in both the METs and the field samples. All PAHs were orders of magnitude below their ambient water quality criteria in both the laboratory and the field.

The most commonly detected PAHs were phenanthrene, fluoranthene, and pyrene. These PAHs are among the most common in the urban environment and are associated with a variety of modern sources, including urban runoff. Chrysene and fluorene were also detected sporadically in the METs but not in the field samples.

Other Semivolatile Organics. Except for a single detection of methylphenol in the seven-day MET (total analysis only), all phenolic compounds were undetected in the laboratory.



Phenolic compounds were also undetected in the field. For those few phenolic compounds with water quality criteria, the laboratory and field results were orders of magnitude below those criteria.

No water quality criteria have been promulgated for phthalates. Phthalates were detected in both the METs and the field samples; however, at least some of these detections were caused by laboratory contamination. Phthalates are common laboratory contaminants, especially at the low detection levels utilized in this sampling program.

Of the remaining semivolatile organic compounds, water quality criteria have been developed only for hexachlorobutadiene and 1,2-dichlorobenzene. In both laboratory and field samples, neither compound was detected, and detection limits were orders of magnitude lower than the respective water quality criteria.

Chlorinated Pesticides and PCBs. Field and laboratory samples showed an overwhelming absence of chlorinated pesticides and PCBs, likely due to the general insolubility and immobility of these types of chemicals. No chlorinated pesticides of any kind nor PCBs were detected in either the one-day or the three-day field samples at the rehandling facility. No PCBs were detected in the laboratory METs. A few isolated detections of chlorinated pesticides were found in the one-day MET (total analysis only), including DDE. However, the DDE detection was almost a million times lower than the water quality criterion. Detection limits for these analyses were excellent, typically in the range of a few parts-per-trillion for the pesticides.

Conclusions

Laboratory predictions of dredged material elutriate quality were confirmed by field sampling at the Port's Suttle Road Rehandling Facility. Field and laboratory data support the following conclusions:

- After one day of settling, the laboratory test overestimated the suspended solids concentration in the dredged material elutriate. This difference is attributed to the manner in which settling time was measured at the rehandling facility (i.e., duration of time since elutriate water was allowed to enter the secondary basin) and the enhanced settling efficiency of a two-cell facility. After one week of settling, both laboratory and field data showed the suspended solids concentration in the elutriate had clarified to acceptable levels (in the range of 30 to 40 mg/L).



Port of Portland
May 25, 2001

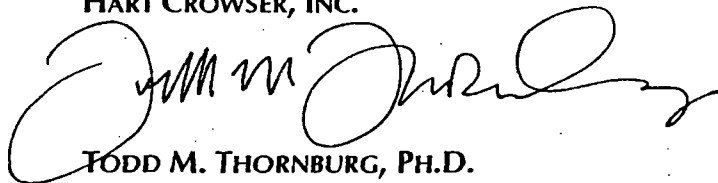
15045
Page 5

- TBT concentrations were above the draft chronic water quality criterion during the early settling periods in both laboratory and field samples. After one week, TBT concentrations were reduced to below the draft chronic criterion. Slight differences between the laboratory and field elutriate data were probably caused by variable TBT concentrations in the dredged material and/or the ambient river water used to slurry the dredged material into the rehandling facility. The very low TBT concentrations observed in the elutriate samples appear to be approaching ambient background levels in the Columbia and Willamette Rivers.
- Dissolved metals concentrations were below their respective water quality criteria in all samples.
- Semivolatile organic compounds were occasionally detected at very low concentrations in the elutriate samples; however, all detections were several orders of magnitude lower than their water quality criteria.
- Chlorinated pesticides were rarely detected at extremely low concentrations in the laboratory MET, but none were detected in the field.
- PCBs were undetected in both field and laboratory samples using low detection limits.

These data confirm the accuracy of the laboratory elutriate tests and validate their use in dredged material characterization.

Sincerely,

HART CROWSER, INC.



TODD M. THORNBURG, PH.D.
Senior Associate

Attachments:

Table 1 - Dredged Material Elutriate Quality Analytical Results

Elutriate_rpt.doc

Table 1. Drifted Material Elutriate Quality Analytical Results for Laboratory and Field Samples
 Port of Portland
 Portland, Oregon

Hart Crowser
 J-15045

Sample ID	Water Quality Criteria EPA, 1999; OAR, 1986 ¹		Modified Elutriate Test (MET)				Suttle Road Effluent (Field Samples)				
			1-Day		7-Day		1-Day	3-Day (Total)	3-day (Diss.)	5-day	7-day
	Acute	Chronic	MET-A (Total)	MET-A (Diss.)	MET-B (Total)	MET-B (Diss.)					
Phenols in µg/L (con't.)											
2-Chlorophenol	-	-	0.02 U	0.02 U	0.02 U	0.02 U					
2-Methylphenol	-	-	0.4 U	0.4 U	0.4 U	0.4 U		0.5 U			
2-Nitrophenol	-	-	0.03 UJ	0.03 UJ	0.04 UJ	0.03 UJ					
3- and 4-Methylphenol Coeluti	-	-	0.003 U	0.003 U	0.008 J	0.003 U		0.004 U			
4,6-Dinitro-2-methylphenol	-	-	0.06 U	0.06 U	0.06 U	0.06 U					
4-Nitrophenol	-	-	0.1 U	0.1 U	0.1 U	0.1 U					
Pentachlorophenol (PCP)	20 (c)	13 (c)	0.1 U	0.1 U	0.1 U	0.1 U		0.2 U			
Phenol	10200 (b)	2560 (b)	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ		0.03 U			
Phthalates in µg/L											
Bis(2-ethylhexyl) Phthalate	-	-	0.5 U	0.5 U	0.5 U	0.5 U		1.6 B			
Butyl Benzyl Phthalate	-	-	0.03 J	0.02 U	0.02 U	0.02 U		0.03 J			
Di-n-butyl Phthalate	-	-	9.8 J	0.04 J	0.2 U	0.05 UJ		0.14 B			
Di-n-octyl Phthalate	-	-	0.003 U	0.003 U	0.003 U	0.003 U		0.004 U			
Diethyl Phthalate	-	-	1.7	0.27	0.34	0.22		0.03 U			
Dimethyl Phthalate	-	-	0.21	0.02 J	0.05 J	0.02 J		0.05 J			
Misc. Semivolatiles in µg/L											
Benzoic Acid	-	-	0.4 UJ	0.4 UJ	0.4 R	0.4 R		0.5 U			
Benzyl Alcohol	-	-	0.02 U	0.02 U	0.03 J	0.02 U		0.03 U			
Dibenzofuran	-	-	0.007 U	0.007 U	0.007 U	0.007 U		0.008 U			
Hexachlorobutadiene	90 (b)	9.3 (b)	0.006 UJ	0.006 UJ	0.006 UJ	0.006 UJ		0.007 U			
N-Nitrosodiphenylamine	-	-	0.02 U	0.02 U	0.02 U	0.02 U		0.03 U			
1,2,4-Trichlorobenzene	-	-	0.006 U	0.006 U	0.006 U	0.006 U		0.007 U			
1,2-Dichlorobenzene	1120	763	0.007 UJ	0.007 UJ	0.007 UJ	0.007 UJ		0.008 U			
1,3-Dichlorobenzene	-	-	0.006 UJ	0.006 UJ	0.006 UJ	0.006 UJ		0.007 U			
1,4-Dichlorobenzene	-	-	0.005 U	0.005 U	0.005 U	0.005 U		0.006 U			
2,4-Dinitrotoluene	-	-	0.005 U	0.005 U	0.005 U	0.005 U					
2,6-Dinitrotoluene	-	-	0.005 U	0.005 U	0.005 U	0.005 U					
2-Chloronaphthalene	-	-	0.007 U	0.007 U	0.007 U	0.007 U					
2-Nitroaniline	-	-	0.005 U	0.005 U	0.005 U	0.005 U					
3,3'-Dichlorobenzidine	-	-	0.3 U	0.3 U	0.3 U	0.3 U					
3-Nitroaniline	-	-	0.006 U	0.006 U	0.006 U	0.006 U					
4-Bromophenyl Phenyl Ether	-	-	0.007 U	0.007 U	0.007 U	0.007 U					
4-Chloro-3-methylphenol	-	-	0.3 U	0.3 U	0.3 U	0.3 U					
4-Chloroaniline	-	-	0.2 UJ	0.2 UJ	0.2 U	0.2 U					
4-Chlorophenyl Phenyl Ether	-	-	0.006 U	0.006 U	0.006 U	0.006 U					
4-Nitroaniline	-	-	0.005 U	0.005 U	0.005 U	0.005 U					
Bis(2-chloroethoxy)methane	-	-	0.007 U	0.007 U	0.007 U	0.007 U					
Bis(2-chloroethyl) Ether	-	-	0.004 U	0.004 U	0.004 U	0.004 U					
Bis(2-chloroisopropyl) Ether	-	-	0.1 U	0.1 U	0.1 U	0.1 U					
Carbazole	-	-	0.005 U	0.005 U	0.005 U	0.005 U					
Hexachlorobenzene	-	-	0.007 U	0.007 U	0.007 U	0.007 U		0.008 U			
Hexachlorocyclopentadiene	-	-	0.009 UJ	0.009 UJ	0.009 UJ	0.009 UJ					
Hexachloroethane	-	-	0.007 UJ	0.007 UJ	0.007 UJ	0.007 UJ		0.008 U			
Isophorone	-	-	0.06 J	0.01 J	0.03 J	0.01 J					
N-Nitrosodi-n-propylamine	-	-	0.02 U	0.02 U	0.02 U	0.02 U					
Nitrobenzene	-	-	0.004 U	0.004 U	0.004 U	0.004 U					

Table 1.-Dredged Material Elutriate Quality Analytical Results for Laboratory and Field Samples
Port of Portland
Portland, Oregon

Hart Crowser
J-15045

Sample ID	Water Quality Criteria EPA,1999; OAR,1986'		Modified Elutriate Test (MET)				Suttle Road Effluent (Field Samples)				
	Acute	Chronic	1-Day		7-Day		1-Day	3-Day (Total)	3-day (Diss.)	5-day	7-day
			MET-A (Total)	MET-A (Diss.)	MET-B (Total)	MET-B (Diss.)					
Pesticide/PCBs in µg/L											
4,4'-DDD	-	-	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.002 U			
4,4'-DDE	1050	-	0.004 U	0.002 U	0.002 U	0.002 U	0.02 U	0.003 U			
4,4'-DDT	1.1	0.001	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.002 U			
Aldrin	3	1.3	0.003 U	0.003 U	0.003 U	0.003 U	0.02 U	0.004 U			
Dieldrin	0.24	0.056	0.002 U	0.002 U	0.002 U	0.002 U	0.02 U	0.002 U			
Endosulfan I	-	-	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.002 U			
Endosulfan II	-	-	0.004 U	0.004 U	0.004 U	0.004 U	0.02 U	0.002 U			
Endosulfan Sulfate	-	-	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.001 U			
Endrin	0.086	0.036	0.002 U	0.002 U	0.002 U	0.002 U	0.02 U	0.004 U			
Endrin Aldehyde	-	-	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.002 U			
Endrin Ketone	-	-	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.002 U			
Heptachlor	0.52	0.0038	0.002 UJ	0.002 UJ	0.002 U	0.002 U	0.02 U	0.005 U			
Heptachlor Epoxide	0.52	0.0038	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.005 U			
Methoxychlor	-	-	0.003 UJ	0.003 UJ	0.003 U	0.003 U	0.02 U	0.003 U			
Toxaphene	0.73	0.0002	0.03 U	0.03 U	0.03 U	0.03 U	0.5 U	0.03 U			
alpha-BHC	-	-	0.01 U	0.003 U	0.003 U	0.003 U	0.02 U	0.001 U			
alpha-Chlordane	-	-	0.002 U	0.002 U	0.002 U	0.002 U	0.02 U	0.002 U			
beta-BHC	-	-	0.003 U	0.003 U	0.003 U	0.003 U	0.02 U	0.001 U			
delta-BHC	-	-	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.002 U			
gamma-BHC (Lindane)	0.95	-	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.002 U			
gamma-Chlordane	-	-	0.002 U	0.002 U	0.002 U	0.002 U	0.02 U	0.002 U			
Aroclor 1016	-	-	0.08 U	0.08 U	0.08 U	0.08 U		0.04 U			
Aroclor 1221	-	-	0.08 U	0.08 U	0.08 U	0.08 U		0.04 U			
Aroclor 1232	-	-	0.08 U	0.08 U	0.08 U	0.08 U		0.04 U			
Aroclor 1242	-	-	0.08 U	0.08 U	0.08 U	0.08 U		0.04 U			
Aroclor 1248	-	-	0.08 U	0.08 U	0.08 U	0.08 U		0.04 U			
Aroclor 1254	-	-	0.08 U	0.08 U	0.08 U	0.08 U		0.04 U			
Aroclor 1260	-	-	0.08 U	0.08 U	0.08 U	0.08 U		0.04 U			
Total PCBs	-	0.014	0.08 U	0.08 U	0.08 U	0.08 U		0.04 U			

Notes:

1: State freshwater chronic and acute criteria (OAR-340-41), as updated through EPA's revision of the national water quality criteria (EPA, 1999)

-- Not Available

(a): This value is a proposed aquatic life criterion to be considered for adoption; EPA has not responded to public comment for this value

(b): Insufficient data to develop criteria; value presented is the Lowest Observed Effect Level (LOEL)

(c): pH dependent criteria (7.8 pH used)

R: Rejected

U: Not detected at the indicated method detection limit

J: Estimated value

UJ: not detected; the associated quantitation limit is an estimated value

Exceeds freshwater criteria

B: Analyte found in method blank at a significant level relative to sample results

Italicized Font: Method Detection Limit exceeds freshwater criteria